Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14BT2009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOPROCESS PRINCIPLES** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** |  | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Elaborate on the basic configuration of fermentor with a neat sketch and add a note on the chronological development of fermentation industry. | CO1 | 20 |
| **(OR)** | | | | |
| 2. |  | Classify five groups of commercially important fermentation process available. Explain in detail with examples. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | For the following data calculate the difference, average difference, mean square, experimental error and factors showing larger effect.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Factor** | **Car** | **Nit** | **Prec** | **Vit** | **Nit** | **Dummy1** | **Dummy2** | | **Σ(H)** | 5.7 | 23.5 | 8.7 | 9.1 | 9.9 | 1.7 | 9.9 | | **Σ(L)** | 11.9 | 15.7 | 9.5 | 8.9 | 5.1 | 1.8 | 9.8 | | CO3 | 20 |
| **(OR)** | | | | |
| 4. |  | Illustrate with an example, the Plackett Burmann method of medium optimization with Nelson’s example. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Design the sterilization holding time for an industrial scale batch medium sterilization process with an example. | CO3 | 20 |
| **(OR)** | | | | |
| 6. |  | A fermentation process requires 5 liters batch of complex medium to be steam sterilized at 121 °C. Assuming that the medium before sterilization contains l08 bacterial spores of *Bacillus stearothermophilus* per ml and the probability of non-sterility after sterilization is 1 in 1000. Determine the holding time at 121°C and ▼holding. The time of heating from 100°C to 121°C is 10 min and the time of cooling from 121°C to 100°C is 12 min. Assume that the spore death below 100°C is insignificant. And the value of ▼table=12.549, A=9.5x1037min-1, E=283 KJ/mol and R=8.314 J/(mol K). | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | Describe the various isolation and preservation techniques to be followed to isolate and store isolated industrially important microbes in detail. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Explain the process of inoculum development for bacterial process with a neat flow diagram. | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | The experimental measurement of a mixed culture of organism have shown the following reaction whose RQ is found to be 1.44    Calculate:   1. Stoichiometric coefficients a, b, c, d and e. 2. Degrees of reduction for substrate and biomass. 3. Biomass, Nitrogen and CO2 yield coefficient. | CO2 | 20 |